HEWLETT-PACKARD

HP Handheld Computers in Instrument Control

A Guide to Selling and Demonstrating the HP-71B

A Guide to Selling
and Demonstrating the HP-71B

HP-71B — The Heart Of The Solution

You're selling solutions — for applications like quality control . . . portable data acquisition . . . and test instrument control. *With the right equipment,* all these manufacturing applications can be streamlined to increase productivity and profitability. And the right equipment starts with an HP-71B Handheld Computer.

Do your customers need to measure the efficiency of water pumps? Gather data from windmill power generators or solar panels? Find out why electric motors are failing? Know what the power requirements will be for a planned facility expansion?

Whether they want to know if it's moving, flowing, safe, corroding, drying out, heating up, or simply on or off, your customers can get the facts — with the HP-71B as the center of an HP-IL system.

Make Customers of Customers

Many of your potential HP-71B instrument control accounts are already HP customers. They're in companies where HP's leadership in quality is recognized. Now, the HP-71B extends the line of HP computing power to include a unit that can be easily carried, and taken directly to the production line. And, this powerful computer can link to the existing HP networks in your installed customer base.

In This Guide:

This guide highlights the features that make the HP-71B Handheld Computer an ideal solution in the instrument control market. To assist

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you in your sales presentations, we have also included demonstration tips and sample demo programs.

The HP-71B Handheld Computer In Instrument Control

The HP-71B has the features that are essential in instrument control applications:

- Compact size
- Power of a desktop computer
- Powerful I/O structure
- Easy communication with a supervising system
- Enhanced BASIC programming language

Additionally, the HP-71B has important features which give you a competitive selling edge in the instrument control market:

- Standard I/O programming features
- 17.5K byte built-in user RAM (expandable to 33.5K bytes)
- 64K byte built-in operating system ROM (an additional 256K bytes of ROM can be added)
- Four ports that accept any combination of RAM/ROM modules*
- Redefinable keyboard
- Extensive math and statistics capability

For a complete list of features and benefits, refer to the HP-71B Instrument Control Systems brochure (5954-1241).

If your customer is considering a multi-unit purchase, explain how the HP Custom Products program can customize the handheld computer system and further simplify data entry. With the help of Independent Custom Consultants, HP-IL or the HP-71 itself can be built into your customers' products or equipment. See the Custom Products brochure and ICC Capabilities Guide for more information.


The HP-71B In Action

The HP-71B addresses three major segments of the instrument control market: quality control, portable data acquisition, and test instrument control. In these markets, the HP-71B typically provides intelligence for inexpensive configurations of equipment — like electronic measuring instruments, test controllers, and a variety of peripherals for data storage and output. The HP-71 is the local controller, and numerous local nodes can network together under the control of a larger computer acting as a supervisory system.

Quality Control Applications

- Quality control in a plastic molding shop. Each plastic molding machine is linked via an HP-IL interface to an HP-71. The HP-71 monitors and calculates parts produced, cycle time, parts left to produce, and the amount of material needed to complete the job. Operators become more productive as manual record keeping is reduced. Product quality is improved, production is increased through improved yields — and the manager spends more time managing the shop and less time worrying about quality.

An HP-71 is used at each machine in a plastic molding shop. Operators enter part dimensions using electronic measuring tools, and HP-IL ties the system together so the shop manager can check each machine's output at a glance.

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*A total of four ports are available. Therefore, a total of four modules (either ROM, RAM, or a combination of both) may be inserted at a time.
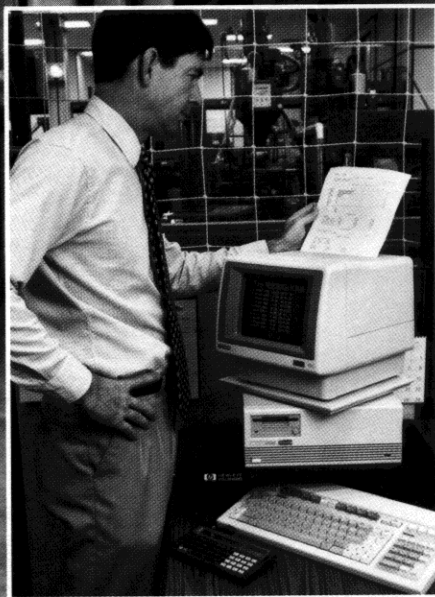
- Integrated circuit (IC) sequencing. An HP-71 is linked to digital latches via an HP-IL/GPIO interface. A robot is used on a production line to perform repetitive, intricate IC positioning procedures. The HP-71 is used to determine which ICs the robot will next load onto the circuit board. Cost savings are realized, and the HP-71 takes only inches of bench space.
- Weighing loaves of bread on a digital scale. An HP-71 is linked via HP-IL interfacing to a digital scale. Sample loaves of bread are weighed. The HP-71 is used to gather statistics and provide a statistical analysis. Corrective action can be taken immediately if weights are out of tolerance. This small, low-cost system eliminates operator error.

Portable Data Acquisition Applications

- Determine the cause of a high rate of electric motor failures in a factory. An HP-71/HP 3421A data acquisition system is set up to collect and store line voltage data, and perform statistical analysis on it. The analyzed information is immediately accessible. The portable system can be set up at the source of the problem, and also provides the speed and accuracy of electronic measurement that would be impossible to obtain manually.

- Charge batteries, and monitor the power output of solar cells in a solar power generator. Data is logged by an HP-71/HP 3421A system to keep track of the usable power going into the system. The batteries are charged when power is coming from the solar cells. The cells are shut off when power is coming from the batteries, so the energy of the batteries supports power requirements instead of discharging through the solar cells. This battery-operable system provides efficient, reliable, inexpensive power regulation.
- Monitor the strain on a conveyor belt carrying sand. Because the weight of loads of sand varies, the strain on the conveyor belt is continually monitored using an HP-71. When the strain is too high, the conveyor is shut down. The result is longer life for belts, and reduced down-time — saving time and money. And because it runs on batteries, power failures are not a factor.

Test Instrument Control Applications

- Test sub-assemblies before they are installed in the final product. Individual test stations are controlled by an HP-71 and HP 3421A Data Acquisition/Control Unit linked by HP-IL. All test stations also are linked to an HP-86 and peripherals. The HP-71 prompts the operator for test instructions such as part inserted, new part, same part, test, and retest; then tests are run. Data is stored on a disc, and can be used at any time to produce control charts and production reports.

- Calibrate LCD displays. An HP-71 and voltmeter, linked by HP-IL, combine to measure voltages across an LCD, so that the display viewing angle can be adjusted correctly. This simple system allows readings to be taken concurrently as the viewing angle is set, resulting in time savings. Again, the system takes only a small amount of bench space.
- Calibrate digital timers. An HP-71 and frequency counter connected by HP-IL is set up on an assembly line. As the operator adjusts the system frequency, the HP-71 provides data which can be used to determine whether or not the timer is working properly. Operator error is eliminated, and the small, low-cost system increases productivity.

You can picture similar scenarios with HP-71B Handheld Computers in portable data acquisition, quality control, and test instrument control applications.

The HP-71, HP 3421A Data Acquisition/ Control Unit, HP 9114A Portable Disc Drive, and ThinkJet Printer provide a complete, portable data acquisition system.
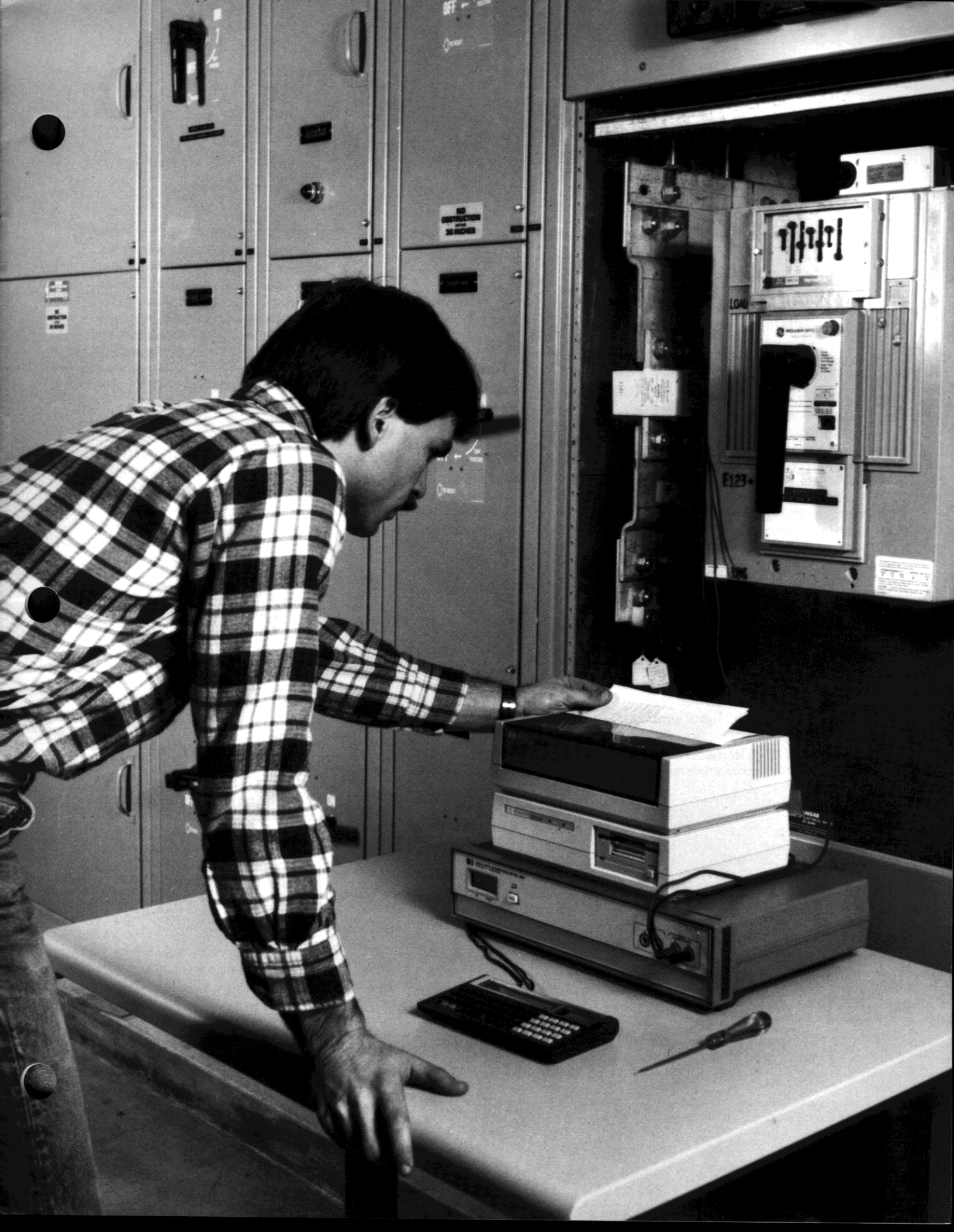
Identifying Potential Customers

Where do you find customers with these types of applications? Manufacturers in the industries listed below are your best bet. Industries are listed in order, with those having the highest potential for dollar volume sales at the top:

- Electronics
- Aerospace
- Utilities
- Petroleum
- Chemical
- Petrochemical
- Pulp and paper
- Rubber and plastics
- Primary metals
- Glass and ceramics
- Textiles

The best starting point for all the control applications is your installed base of HP customers. In addition to the stand-alone advantages of the HP-71, you can sell the networking capability. Look for control applications in your present customer accounts where handheld computers can save time and money, and increase productivity.

For non-HP customers, the HP-71 may be a low-end "foot in the door."

Selling Points

Purchasers of portable distributed digital control systems look for these features, listed in order of priority:

- Service, configuration flexibility, and repeatability
- Ease of maintenance, system stability, and accuracy of computations
- Reputation, technology, ease of installation, cost, and warranties

See the HP-71 Control Systems Price List for information about service, service contracts, and costs.

About HP-IL

The Hewlett-Packard Interface Loop is powerful and easy to use. It is a bit-serial interface designed for low-cost, battery-operable systems. HP-IL allows the HP-71 (and other computers) to control instruments, serve as a system controller capable of transmitting and receiving data, and perform a wide variety of information management functions.

In HP-IL systems, devices are connected by two-wire cables leading from the output port of one device to the input port of the next, until all devices form a closed loop. This loop structure provides a unique capability through auto address assignment, device capability identification, power ON/OFF control, error checking, and hold-until-ready protocol.

Auto addressing means HP-IL enables the controller to assign addresses automatically. So your customer does not need to be concerned about address assignments or conflicting addresses.

The device identification feature allows software to determine what devices are on the loop and take appropriate actions. This frees your customer from the necessity of knowing the address of each device on the loop.

The power ON/OFF control conserves batteries, while automatic error checking assures your customer that data is accurately transferred.

The hold-until-ready protocol assures that fast and slow devices can operate in the same HP-IL system.

HP-IL Is An Alternative To HP-IB

HP-IL is not intended as a replacement for HP-IB, but rather as a low-cost, low-power alternative.

Although HP-IB and HP-IL serve the same basic function, they differ in many respects.

1. Because of HP-IL's lower power consumption, it is usable with portable, battery-powered systems. Generally, HP-IB is not.

2. HP-IL system components will generally be low cost and have moderate performance; HP-IB system components are at the medium- to high-end of the performance spectrum and generally cost more.

3. HP-IL systems work at relatively low data rates compared to HP-IB, and relatively high data rates compared to RS-232C. For example, the HP-71 is capable of transmitting at speeds of 5K to 6K bytes per second (which is equivalent to 50,000 to 60,000 baud on RS-232C). Maximum data rate is not dependent on HP-IL cable length (see HP-IL Transfer Rate section).

4. HP-IL allows device separations of up to 100 meters with shielded, twisted pairs (10 meters with zip cord). HP-IB requires extender hardware for long distance connections.

HP-IL Transfer Rates

HP-IL transfer rates are dependent on both the slowest active device, and the number of devices on the loop. Each data byte must pass through each device. A small delay is associated with each idle device that retransmits the byte. Therefore, the net delay increases slightly for each device added to the loop.

Each device that needs to process the byte holds it for a certain length of time. For example, a 300-baud modem allows the bytes to go around the loop only as fast as it can send them out. So the effective HP-IL speed will be 30 bytes (characters) per second when the modem is active. Some additional software delays also may be experienced if the data byte coming into a device just misses a software loop, and has to wait for the software loop to get back to it.

The following tables provide a guideline on data rates for some HP-IL devices. These data rates represent the speeds at which the devices effectively process the data; i.e., take a data byte from HP-IL and send it out on RS-232C, or write it to a file (within the limitations noted above).

Device	Data Rate (bytes/ second)	Condition
HP-71	8K	HP-71 copying to a loop (no devices on the loop)
	6.4K	HP-71 copying in a file
	4.5K	OUTPUT statement; no formatting (USING)
	4K	ENTER statement; no formatting (USING) and version 1B of the HP-IL module
82164A	Up to 1.9K	Completely dependent on RS-232C baud rate once the buffer is full. 300 baud is .3K; 19,200 baud is 1.9K
82169A	2.7K	Passing data from HP-IL to HP-IB in Translator Mode
	3.0K	Passing data from HP-IB to HP-IL in Translator Mode
82161A	250	Reading or writing data to the tape
82162A	24	Printing data once the buffer is full
ThinkJet	150	Printing data once the buffer is full
9114A	6K	Maximum sustained transfer rate

Device	Data Rate (readings/ second)	Condition
3421A	10	DC volts, 3½ digits, auto zero off, different channels
	3	DC volts, 5½ digits, auto zero off, different channels

Demonstrating the HP-71

You've identified the instrument control customers in your area and reviewed selling points and HP-IL. Now here are some tips and demonstration ideas that will help you make a strong HP-71B presentation.

HP-71B Features and Benefits

Since many people are not familiar with the features and capabilities of a handheld computer, open your presentation of the HP-71B with a discussion of the key features and benefits of the product. Be sure to point out:

- Battery operation (continuous memory)
- Powerful BASIC language (including statistics)
- Timer and clock
- User-definable keyboard
- CALC mode for powerful calculations
- Four plug-in RAM/ROM ports
- 64K bytes of built-in operating sytem ROM (an additional 256K bytes of ROM can be added)
- 17.5K bytes of built-in RAM (expandable to 33.5K bytes by adding four 4K-byte RAM modules)
- Optional HP-IL interface; links to GPIO, RS-232C, and HP-IB; wide range of HP-IL peripherals

Refer to page one of this guide and to the HP-71 Instrument Control Systems brochure for details and additional product features.

Emphasize the portability of the battery-operated HP-71B, and point out the associated advantages to the control segment of the market:

- Decreased plant wiring
- Easy configuration at the plant and local levels

*Refer to HP-71/HP Touchscreen and HP-71/ HP 2392A Terminal Development Station application note (5954-1274) for alternate methods of developing HP-71 programs.

- Easy expansion and contraction of the number of loops
- Easy maintenance
- Easy to build in redundancies
- Offers computing capability with complete mobility
- Rugged design holds up under steady use in the factory

Next, point out the data communication options. The HP-71B can communicate with a host computer either by modem or direct interfacing over RS-232C lines. The HP 82168A Acoustic Coupler can be used over telephone lines. The HP 82164A HP-IL/RS-232C Interface can be used to link directly to other mainframes or personal computers. Use the HP 82488A DataComm ROM to provide a user-friendly software pac to facilitate this link.

Getting Started

Now is the time for an actual product demonstration. As you turn the HP-71 on, explain that the product runs continuously for up to 60 hours on batteries.

The HP-71B is as easy to program as it is to use. Simply enter the BASIC language statements on the HP-71 keyboard.* The program will be automatically stored in CMOS RAM. No "store" or "load" commands are required.

HP-IL Basics

Programming instruments such as the HP 3421A Data Acquisition/ Control Unit with the HP-71 requires that the HP 82401A HP-IL Interface be installed in the HP-71. This module provides the I/O keywords you are probably already familiar with, like ENTER USING, OUTPUT USING, TRIGGER, and SEND.

Be sure the HP-71 is turned off before connecting or disconnecting the interface and cable connections. Follow the instructions for installing the HP 82401A in the HP-71 found in section 1 of the HP 82401A manual. The connection of HP-IL peripheral devices is also described in the manual. The devices may be connected in any order, as long as there is one continuous loop. After you have connected them to the HP-71, turn on all the HP-IL devices first. Then turn on the HP-71.

The HP 82401A manual describes six different ways for you to identify HP-IL devices: address, assign code, device word, device ID, accessory ID, and volume label. See the HP 82401A manual for more information.

Entering a Program

To enter a program on the HP-71B:

1. Give the program name. Enter: EDIT 'PGMNAME' [ENDLINE]

2. Get ready to enter program lines by requesting automatic line numbers.
   Type: AUTO [ENDLINE]

3. The automatic line numbering will start with line 10. Enter your program, pressing [ENDLINE] after each line.

4. The program is automatically stored in CMOS RAM. (No store command is required.)

5. Press [ATTN] to return to EDIT mode.

6. To run the program, type: RUN 'PGMNAME' [ENDLINE]
   If 'PGMNAME' was the last program edited or run on the HP-71B, you can simply press the [RUN] key to execute the program.

Demonstrations

The following programs (except Setting the HP-71B Clock) are available on 3½″ disc, magnetic card, or cassette tape at a cost of $15.00. Specify media type when you order part number 71-03421 from:

Hewlett-Packard
Users' Library, Dept. 39UL
1000 N.E. Circle Blvd.
Corvallis, OR 97330

Setting the HP-71B Clock

The HP-71B has a built-in clock and calendar that runs whether the HP-71B is on or off.

To display the date and time, enter the following:
1. DATE$ [ENDLINE]
2. TIME$ [ENDLINE]

If the time or date is incorrect, you may correct either one by entering the following:
1. SETDATE "YY/MM/DD"
   [ENDLINE] (where YY is year, MM is month, and DD is day)
2. SETTIME "HH:MM:SS"
   [ENDLINE] (where HH is hour [24 hour clock], MM is minute, and SS is second)

HP-71B/HP 3421A System Demo

The HP-71B/HP 3421A is a low-cost, high-performance data acquisition system that allows your customer to measure temperature, pressure, level, and flow. The typical system with 24 input channels and 6 output channels outlined below costs less than $4,500!*

- HP-71B (with HP 82401A
  HP-IL Interface) $ 650
- HP 3421A (with three
  Opt. 020)   2,440
- HP 9114A Disc Drive   795
- HP 2225B ThinkJet printer 495
                           ─────
                           $4,380

See Product Note 3421A-2 for numerous example programs using the HP 3421A with the HP-71B Handheld Computer.

Required Equipment:
- HP-71B (with HP 82401A HP-IL Interface)
- HP 3421A demo box
- HP 3421A (with one multiplexer, Opt. 020)

Recommended Equipment:
- HP 9114A Disc Drive
- HP 2225B ThinkJet printer

Instructions:

Install Opt. 020 in slot 0 of the HP 3421A. Install the breadboard card from the demo box in slot 1 of the HP 3421A.

Type: EDIT DEMO and press [ENDLINE] on the HP-71B. Then, enter the program lines that follow.

To start the demo program, type: RUN DEMO and press [ENDLINE] The program will read temperature on channel 7, pressure on channel 8, and frequency on channel 9 of the HP 3421A. The results will automatically be printed and stored. The HP 3421A will turn itself off, and wake up 30 seconds later and repeat the process until ten scans have been completed.

While the demo is running, you can place your hand on the demo box hot plate to raise the temperature, increase the pressure using the tire pump, and change the frequency by spinning the wheel.

Some other useful commands are:
- Type: PLIST DEMO3421
  [ENDLINE] (prints out the demo program)
- Type: COPY DEMO3421 TO DEMO3421:MASSMEM
  [ENDLINE] (copies demo to disc)
- Type: COPY DEMO3421:MASSMEM TO DEMO3421 [ENDLINE] (copies demo from disc to HP-71)

Note: The demo program will purge the data files each time you run the program (line 130). If you are using a new disc to store the data, you may have to initialize the disc first (type: INITIALIZE :MASSMEM).

*U.S. prices

Line #	Program Statement	Explanation
10	!	Demo for HP-71B to HP 3421A
20	DIM A(10,3),T$(10),I1$[70],I2$[50] @ J=1 @ CFLAG 1	
30	RESTORE IO @ ON ERROR GOTO 'DISPLAY'	
40	PRINTER IS :PRINTER @ B$="PRINT" @ GOTO 'OFF'	If printer is present, assign printer.
50	'DISPLAY' : B$="DISP"	Printer not there, so display.
60	'OFF': OFF ERROR	
70	IF DEVADDR("MASSMEM")=−1 THEN M$=":MAIN" ELSE M$=":MASSMEM"	If disc is present use it, else RAM.
80	GOSUB 'PURGE'	
90	GOSUB 'CREATE'	
100	!	Main routine that logs the data.
110	D=DEVADDR("HP3421A")	
120	ON TIMER #1,30 GOTO 'START'	
130	'START': !	
140	T$(J)=TIME$	
150	OUTPUT :D ;"TEM7"	
160	ENTER :D ;A(J,1)	
170	PRINT #1;A(J,1)	
180	OUTPUT :D ;"TWO8"	
190	ENTER :D ;A(J,2)	
200	PRINT #2;A(J,2)	
210	OUTPUT :D ;"FRQ9"	
220	ENTER :D ;A(J,3)	
230	PRINT #3;A(J,3)	
240	PRINT #4;T$(J)	
250	GOSUB B$	Print or display results.
260	J=J+1 @ IF J=11 THEN 'EXIT'	
270	BYE	
280	'EXIT':	Ending routine.
290	OFF TIMER #1 @ CFLAG 1	
300	IF B$="PRINT" THEN PRINT CHR$(12)	
310	ASSIGN #1 TO * @ ASSIGN #2 TO *	
320	ASSIGN #3 TO * @ ASSIGN #4 TO *	
330	END	
340	'PURGE':	Subroutine to purge existing files.

9

Line #	Program Statement	Explanation
350	ON ERROR GOTO 'EXIT1'	Return if files do not exist.
360	SFLAG –1	Trap warning for RAM based files.
370	PURGE 'TEMP'&M$ @ PURGE 'PRES'&M$	
380	PURGE 'FREQ'&M$ @ PURGE 'TIME'&M$	
390	'EXIT1': OFF ERROR @ CFLAG –1 @ RETURN	
400	'CREATE':	Subroutine to create data files.
410	CREATE DATA 'TEMP'&M$,5 @ ASSIGN #1 TO 'TEMP'&M$	
420	CREATE DATA 'PRES'&M$,5 @ ASSIGN #2 TO 'PRES'&M$	
430	CREATE DATA 'FREQ'&M$,5 @ ASSIGN #3 TO 'FREQ'&M$	
440	CREATE TEXT 'TIME'&M$,5 @ ASSIGN #4 TO 'TIME'&M$	
450	RETURN	
460	'PRINT':	Print routine if a printer is on the loop.
470	IF FLAG(1) THEN 'PNEXT'	Do not print header again.
480	I1$ = '2x,"Time",5x,"Temp (Deg C)",5x,"Pres (PSI)",5X,"Flow (Freq)"'	
490	PRINT USING I1$ @ SFLAG 1	
500	'PNEXT': !	
510	I2$ = "8A,5x,ddd.dd,10x,ddd.dd,10x,ddddd"	
520	PRINT USING I2$;T$(J),A(J,1),A(J,2),A(J,3)	
530	RETURN	
540	'DISP':	Display routine if printer is not on loop.
550	DELAY 1,.5	
560	DISP "Time is ";T$(J)	
570	DISP "Temp (Deg C) = ";A(J,1)	
580	DISP "Pressure (PSI) = ";A(J,2)	
590	DISP "Flow (Freq) = ";A(J,3)	
600	RETURN	

Modem Demo

This demo provides an example of how the HP-71 and Hayes Smartmodem can be used to transfer data over phone lines.

Required Equipment:

- HP-71B Handheld Computer
- HP 82401A HP-IL Interface
- HP 82164A HP-IL/RS-232C Interface
- Hayes Smartmodem 1200 (comes with a power cord, patch cord, and AC adapter)
- One serial cable, female to male connection (standard 25 pin configuration)
- HP-IL Cables (2)
- HP 82059B AC Adapter
- Telephone line with an RJ11 jack

Instructions:

Connections

Configure the HP-IL/RS-232C interface as a DTE terminal (refer to pages 22 and 23 of the HP-IL/RS-232C interface owner's manual for specific instructions).

Plug one end of each HP-IL cable into the HP-71, and the other ends to the HP-IL/RS-232C interface.

Plug the RS-232C cable into the HP-IL/RS-232C interface and the Hayes Smartmodem.

Connect a phone line to the modem.

Plug one end of the HP AC adapter into a 110V wall outlet, and the other end into the HP-IL/RS-232C interface. Do the same with the Hayes AC adapter.

Running the Demo

Enter the following program into the HP-71 by typing in: EDIT DEMOHAYS [ENDLINE]

To start the demo, press the [RUN] key on the HP-71. To halt the program, the [ON] key may need to be pressed several times.

When the program is running, it will prompt for a name, and then call the Infolink system at Corvallis, OR. The program will then send the name to Infolink, disconnect, wait two minutes, then re-dial and send more data to Infolink.

The time between calls can be changed by pressing [FETCH] 110 and changing the 140 seconds to any value of your choice.

To change the phone number, press: [FETCH] 150 [ENDLINE] If tone dialing cannot be used, change the DT to DP. If a 9 or other number must be used to get an outside line, separate it from the phone number with a comma.

Line #	Program Statement	Explanation
10	DESTROY ALL @ RESTORE IO	
20	DELAY 1.5,.2 @ OPTION BASE 1	
30	DIM R$[200] @ B=0 @ N=1	
40	A = DEVADDR("HP82164A")	
50	IF A=–1 THEN DISP "Modem not found" @ GOTO 'END'	
60	REMOTE	
70	OUTPUT :A ;"SB6;C0;P0;SS0;SW1;EE0;SE0; R0;R1"	Initialize RS-232C.
80	LOCAL	
90	INPUT "Your Name: ","John Doe";N$	
100	'TIMER':	Main Loop.
110	ON TIMER #1,140 GOTO 'CALL'	Change this line to change timer.
120	BYE	
130	'CALL': OFF TIMER #1	
140	DISP 'Dialing HP Infolink...'	
150	OUTPUT :A ;"AT DT 1,503,7521167 "	The phone number is here.
160	WAIT 20	
170	'RECEIVE':	Look for connection to Infolink.
180	ENTER :A USING "#,K";R$	
190	IF R$="" THEN 'RECEIVE'	
200	IF NOT POS(R$,"CONNECT") THEN 'BUSY'	
210	DISP "Connect" @ T=1	
220	DISP "Sending ";N$&STR$(N)	
230	OUTPUT :A ;N$&STR$(N)&CHR$(13)	Send to Infolink.
240	OUTPUT :A ;"OFF"&CHR$(13)	Terminate Infolink.
250	GOSUB 'DISC'	
260	IF N#4 THEN N=N+1 @ GOTO 'TIMER'	
270	DISP "Three sets of data"	
280	DISP "containing your name"	
290	DISP "have ·been sent."	
300	DISP "Demo is concluded."	
310	DISP "Thank-you."	
320	'END' :	Clean up and quit.
330	CFLAG –23 @ DELAY .5,.125 @ DESTROY ALL	
340	END	
350	'BUSY' :	Infolink is busy, hang up the phone.

Line #	Program Statement	Explanation
360	GOSUB 'DISC'	
370	DISP "Infolink Busy"	
380	IF T#4 THEN DISP "Will try again" @ T = T + 1 @ GOTO 'TIMER'	
390	DISP "for third time."	
400	DISP "Please try later."	
410	GOTO 'END'	
420	'DISC' :	Disconnect and hang up the phone.
430	WAIT 5 @ OUTPUT :A ;"+"; @ OUTPUT :A ;"+"; @ OUTPUT :A ;"+";	
440	WAIT 5 @ OUTPUT :A ;"ATH" @ WAIT 5	
450	REMOTE @ OUTPUT :A ;"R0;R1;" @ LOCAL	Clear RS-232C buffers.
460	RETURN	

HP-71/HP Touchscreen Terminal Development Station (HP-71 "KEYBOARD IS")

This demo shows how the HP Touchscreen computer can be used as a terminal in HP-71 program development. For comprehensive information, refer to the HP-71/HP Touchscreen and HP-71/HP 2392A Terminal Development Station (HP-71 "KEYBOARD IS") application note (5954-1274) which is included in this mailing. The complete program is included on media available from the Users' Library. See the beginning of the Demonstrations section for details.

Required Equipment:

- HP-71B Handheld Computer
- HP 82401A HP-IL Interface
- HP 82441A FORTH/Assembler ROM *or* 00071-90097 Software Developers' Handbook*
- HP Touchscreen Computer
- HP 82164A HP-IL/RS-232C Interface
- HP 82059D AC Adapter/Recharger
- Two HP-IL cables
- One serial cable, female to male connection (standard 25-pin configuration)

Hardware Configuration:

HP-IL/RS-232C Interface

Configure the HP-IL/RS-232C interface as a DCE terminal.

Terminal Configuration:

Touchscreen

To configure the Touchscreen to the appropriate terminal configuration, change XmitFnctn(A) to (Yes) from "System Defaults." For "Port1 Config," change Baud Rate to (9600), Parity to (None), Data Bits to (8), and EnqAck to (No) from "System Defaults." (NOTE: Always press (f1) "Save Config" after corrections have been made.) Be sure an "*" is in the lower right corner of the "Remote Mode" block.

After configuring the Touchscreen, run the KBD150 program on the HP-71 by typing the following (assuming the program has been entered into the HP-71 either by hand or by a mass storage device):
RUN KBD150 (ENDLINE)
This program configures both the HP-71 and the terminal.

When you are finished with this demo, be sure to type the following on the HP-71:

Delay .5,.125 (ENDLINE)
CFLAG(–21) (ENDLINE)
Reset escape (ENDLINE)
Keyboard is* (ENDLINE)
Display is Display (ENDLINE)

hp HEWLETT PACKARD

For additional information, visit
your nearest HP dealer. For the
location and number of the dealer
nearest you, call toll-free 1-800-FOR-
HPPC (1-800-367-4772).